AMRAD NEWSLETTER

Amateur Radio Research and Development Corporation NOV/DEC '83

AMRAD Meetings for 1984

As listed in the last issue of the newsletter the following is the list of monthly AMRAD meetings (Note that Sept. is not the first Monday, as that is a holiday):

February 6	Hal Feinstein on Spread Spectrum
March 5	
April 2	
May 7	Update on Trenton and Dayton
June 4	Horse Race Preparations
July 2	
August 6	
September 10	
October 1	
November 5	
December 3	Annual Business Meeting

Upcoming Events

Computer Show and Swap Meet

The Capitol Computer Group is sponsoring a computer show and swap meet at the Baltimore Civic Center on March 18, 1984. Admission for the general public is $3.00 at the door.

Trenton Computer Festival

The Trenton Computer Festival will be held in Trenton, NJ on April 14 and 15 at the Trenton State College.

Third ARRL Computer Networking Conference

The Third ARRL Computer Networking Conference will be held on April 15, 1984 at the Trenton Computerfest starting at 10:30 AM. No additional fees are required to attend this conference. Paul, W4RI is looking for camera-ready papers for this conference by March 15, 1984. For an author's kit, call 203-666-1541 and ask for Marian Anderson, WB1FSB.

Dayton Hamvention

The Dayton Hamvention will be held April 27, 28, and 29. 1984 at the Hara Arena. Opening times are:

Friday, April 27	Noon
Saturday, April 28	8 AM
Sunday, April 29	8 AM

Annual AMRAD Horse/Human Race Support

Once again, AMRAD will be providing communications for the Old Dominion 100 Mile Endurance Race and Run. In 1984, it will be held June 10 and 11. We are planning to expand our coverage this time to include a distributed database system based on packet radio technology. Bob, WB4APR is working on this database system. If you are interested in helping out (and having a good time in the mountains), please contact Bill, WB4NFB.

AMRAD Packet Repeater

The WB4JFI5 AMRAD packet repeater on the WDVM/WJLA TV tower has been moved in frequency. It used to be on 147.585 MHz, but in order to reduce adjacent channel problems with simplex activity on 147.60 MHz, the frequency has been changed to 145.010 MHz. It seems to get out fine, expecially to the south, since the antenna seems to be on the south leg of the tower, at the 200 foot level. Thanks to Sandy, WB5MMB for the suggestion of the new frequency, and the work necessary to move the frequency of the repeater.

AMRAD CBBS System

Thanks to the help of Ward Christensen (co-author of the C.B.B.S. (TM)) the AMRAD CBBS is back up and running. It has been upgraded both in hardware and software. It is now running on 8 inch drives (single density), still supports a PMMI modem, and now has a real-time clock. Very shortly, packet radio software from AMRAD will be available directly from the CBBS system, either using the modem 7 type protocol, or as a normal ASCII file. More details will follow, and will also be available on-line on the CBBS. The phone number is (703) 734-1387, and it is being slanted toward Amateur Radio activities (since the Washington D.C. area now has enough other bulletin boards to support general users). We are also looking at making it possible to leave articles for the newsletter on the CBBS, if users think that is a good idea. Please check in and say hi from time to time.

PAM Progress

Paul's Packet Addaptive Modem (PAM) is getting very close to becoming available. A couple boards have been made, and they are being stuffed right now. These modems are designed for use on HF, and is speed adjustable by a couple lines on the data connector. The modulator generates MSK at 600 Hz, while the demodulator is a standard FSK filter type using the National MF-10 switched-capacitor filter. For more information on this board, look in The Second ARRL Amateur Radio Networking Conference Proceedings. We will report on any developments of the PAM as they occur.

Commodore 64 Projects

One of our Commodore enthusiasts has taken on trying to make/modify a TTY interface to use with the Commodore 64. With the number of 64's out there (yes, even yours truly has one), it is becoming the standard system for use as AMRAD's intelligent controller. I'm not ready to endorse the C64 as a general purpose full-blown computer system, but for adding smarts to spead spectrum, packet radio, automated direction finding, and as a glass TTY it is hard to beat. Especially when one adds the Z80 CP/M system. Some of us have just gotten the disk drive, CP/M and some 65XX assembly language development software. We will be working on the above projects, and reporting back as various projects progress.

GLB Electronics PK1 Update

The new AX.25 EPROMS for the GLB board came in, and the board seems to work fine. I will report more on the updated GLB software in the next issue of the newsletter.

USING THE BELL 103 STANDARD ON HF PACKETS

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With the growing interest in HF packet radio, several of us have attempted communicating on 80 and 40 meters using the existing packet boards and 202 modems at 300 baud. The results are as bad as you would expect depending on your optimism.

To operate HF with the Vancover board, first, you have to modify the baud rate chip to run at 300 baud. This can be accomplished as described by WB4JFI in the July/Aug 82 issue or, more simply, by using a 7474 as shown in figure 1. Second, you must disable the 202 carrier detect because most of the QRM on the HF bands usually results in a steady carrier detect. Third, you have to figure out how to tune in the signal (watching carrier detect is useless. Dave, K8MMO is experimenting using the eye pattern available from the VADIC 202 Modems).

The problem in the crowded amateur bands is QRM! Using the 202 modems, several signals will appear in the receive bandwidth destroying data integrity. In the 202, the 3db bandwidth to handle the 1000 Hz shift between 1200 and 2200 Hz is probably 1200 Hz or more. Since most 202 modems were designed for half duplex operation, there is very little bandpass filtering in the early stages so that virtually everything in the HF receiver audio passband gets into the modem.

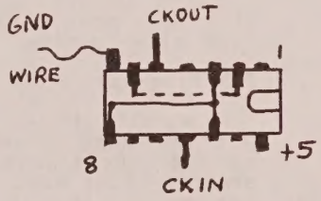
The only solution to reduce QRM is to narrow the modem bandpass. This, unfortunately will restrict the available baudrate, but since 300 baud is the maximum allowable baud rate at this time, it seems that the narrow 200 Hz shift and effecient bandpass filters of the Bell 103 Originate/Answer modems might be a good solution. I have been using a 103 modem for years in copying 170 Hz RTTY signals and have noticed it performs comparable to the torroid filtered DT-600 which was popular about five years ago. The 103 has two bandpass filter stages because it operates full duplex and must ignore its own transmit tones which are as much as 30 db higher than the desired received tones and only 800 Hz away.

Using the 103 ORIGINATE modem on HF then has these distinct advantages: Narrow bandwidth, bandwidth proportional to maximum allowable baud rate, easy availability, carrier detect with X/Y scope tuning aids, well known performance, and ability to receive without modification. The single disadvantage which was noted back when ASCII was first permitted in 1978 was the requirement to transmit ANSWER and receive ORIGINATE so that the send and receive tones would be the same, 2225 mark and 2025 space.

Fortunately, at that time, AMRAD had developed a four resistor modification to a readily available surplus VADIC 103 modem that would enable it to both send and receive 2225/2025 Hz tones. Several articles describe various mods to these modems to make them do any number of frequencies from RTTY at 2125/2295 to TTY for the Deaf at 1400/1800. See the July 78, Aug 78, Nov 78, Oct 79, Jul 80, Aug 80, and Oct 80 issues of the AMRAD Newsletter. These modems interface to the packet board as shown in figure 2. We still have many of these modems available at $20 each. Write to the author at the above address.

7474 LEAD PREPARATION:

* Cut off pins 1,4,9,10 & 14.
* Bend pins 2 and 6 under and connect together.
* Bend pins 3,8 and 12 on top and connect together.
* Bend pins 5 and 11 out to match clock trace on board.
* Connect 3 inch ground wire to pin 7 and trim pin.
* Insert pin 14 into +5 volt hole and solder 5 and 11 to clock trace as shown.
* Connect ground wire.



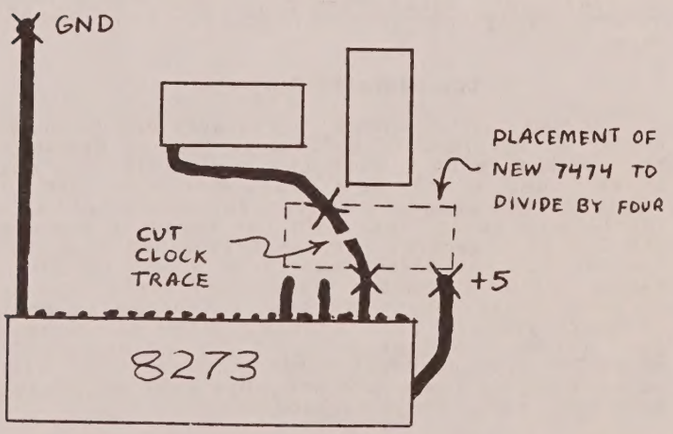


FIGURE 1. By bending a few leads on a 7474 dual-D flip-flop and adding one ground wire, it can be soldered in place over existing lands to divide the baud rates by 4.

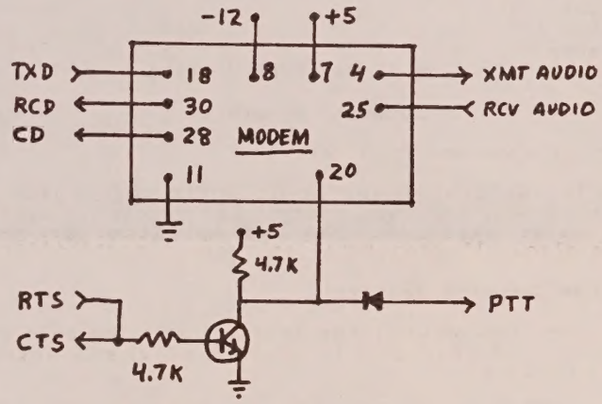


Figure 2. After making the four resistor mod to the transmit tones, the VADIC 103 modem interfaces to the Packet board and HF transceiver in a very simple manner.

There is currently some packet activity on 10 MHz using 200 Hz shift around 10.140 MHz on the weekends. Since this is in the middle of current RTTY activity, it is suggested that a permanent HF packet frequency of 10.14900 mark and 10.149200 space at the very top of the band be agreed to for automatic stations. This would equate to a dial reading of 10.151225 MHz for users of bell 103 modems on lower sideband, and 10.15080 MHz for users of TAPR boards modified for 200 Hz shift. The proximity of WWV should make it easier to verify our calibration.

As soon as the minimum-shift-keying (MSK) modem developed by Paul, W4RI and Bob Watson is ready to go, K8MMO and WB4JFI will begin testing them using a 600 Hz shift. An STA is being prepared to ask for authority from the FCC to experiment at higher speeds. Proposed frequencies for packet activity on 80 and 40 meters could be near 3698.5 and 7098.5 KHz.

Currently there are two voice nets which discuss HF packet activity. One is on 15 meters Sundays right after the AMSAT net on 21.280 MHz at 1900 UTC. The other is an informal get-together of AMRAD packeteers around 7270 at 1500 EST on Saturdays.

Review Of Bill Ashby Packet Radio Board

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Last issue of the newsletter, I reviewed the GLB Electronics PK1 packet board. Another board that has come out recently is the Bill Ashby and Son's PAC/NET packet board. This board follows more in the line of the "traditional" Terminal-Node-Controller (TNC) system than the GLB, and as such costs more than the GLB board.

PAC/NET Hardware Description

The Ashby board is actually a smaller, updated version of the original Vancouver board. It has been designed to be compatible software-wise with the Vancouver board, which makes it very useful for those who are familiar with the Vancouver boards. Figure 1 is a layout of the board, which is 4.5 by 6 inches. It runs on 8-10 volts and draws approximately 1/2 amp. This board does generate true RS-232 voltage levels, thanks to an Intersil IC which converts +5 volts (from a standard 3 terminal regulator) to the minus voltage necessary to be RS-232 compatible.

One nice feature of the Ashby board is that it uses a programmable-logic-array (PAL) as the address decoder instead of the more classic form of address decoding. This will allow different RAM/EPROM sizes and mixtures just by using a different PAL. The board comes with 4K each of RAM and EPROM (2-6116 and 2-2716), but other combinations are available from Ashby by special order. Several of us in AMRAD are of the opinion that the Vancouver board already suffers from lack of memory (especially under AX.25), both in EPROM and RAM. The Ashby board skirts this problem nicely since the amount of memory can be altered to some extent by simply changing a chip.

The CPU used on the Ashby board is the same as the Vancouver board, an 8085, running at the same 2.4576 MHz rate (from a 4.9152 MHz crystal). The interrupts necessary for operation are the same also, allowing total software compatibility.

As far as terminal/computer input and output goes, Ashby decided to drop the terminal parallel chip, leaving only the standard 8250 serial device for the terminal connection. This shouldn't bother too many people, as the parallel interface was used rarely, if ever. This could become a drawback only if real high link speeds are anticipated, causing the link throughput to be limited by the RS-232 serial interface. At this point, the original Vancouver code (and its modifications for AX.25) seems to be limiting the speed more than anything else, so I don't anticipate any problems from the lack of a parallel interface.

The link channel interface is through the familiar Intel 8273 HDLC controller chip. Unlike the Vancouver board however, PAC/NET does not bring out all of the HDLC handshaking lines to the user, nor are they all buffered for RS-232. The lines available (both for the terminal and HDLC interfaces) are shown in Table 1. When running at speeds higher than 9600 bps, the DPLL inside the 8273 is not usable. Therefore, the clock for the UART portion of the 8273 must be provided externally, usually from the "modem". This must be accomplished externally by the user on the PAC/NET board, while it is a simple jumper alteration on the Vancouver board. I don't anticipate this being a problem, as almost nobody is going higher than 9600 bps over an Amateur Radio channel at this time.

Wire Colr	Signal	IN/OUT
Brown	Terminal CTS	Input
Red	Reset (To Ground)	Input
Orange	HDLC Rx Data	Input
Yellow	HDLC Tx Data	Output
Green	HDLC RTS (xmt)	Output
Blue	Terminal Tx Data	Output
Purple	HDLC PA2 (TTL)	Output
Gray	Terminal RTS	Output
White	HDLC Carrier Det.	Input
Black	Terminal Rx Data	Input
5-Gray	5 Ground Wires(J3)	Output

Table 1. External Connections

I should point out that one area that could have been improved upon in the Vancouver board that Ashby didn't alter is the method of deriving the speed of the link channel. Both boards use a CD4024 seven-stage counter to divide the system clock by various amounts to achive the *32 clock required by the 8273. This allows speeds from 9600 to 600 bps. The Vancouver board allows the speed to be changed by setting a DIP switch (one bad thing about the Vancouver board, ALL outputs are on one side of the switch, while all terminals on the other side of the switch are tied together, so if a user accidentally closed two or more switch positions those outputs of the CD4024 would be shorted together, which is not good). The Ashby board doesn't have this switch. Instead, a jumper area is provided for hard-wiring the speed, with the normal speed of 1200 bps being jumpered by an etched trace on the board. This system precludes quick speed changes. Both boards have the same problem for HF operation, the CD4024 doesn't divide down the clock far enough. Normal HF operation of packet radio is at 300 baud at the moment, with some operation at 150 or even 75 bps.

In order to run a Vancouver or Ashby board at these speeds, one must pull out the CD4024, and supply an external divider (usually a CD4040 12-stage counter). I have an old board which I used with the Vancouver mods for software speed control that I plug into the CD4024 socket. This board has the outputs of a CD4040 counter chip going into a 74150 multiplexer. The select lines for the multiplexer are driven either by a 4-bit latch for software control, or a DIP switch for user control. The output of the multiplexer is then fed to the 8273 thru the CD4024 output pins. This system allows me to alter the link speed any time I want, so I can operate HF or VHF/UHF quickly and easily. Maybe in future releases of these boards, the design might be altered to allow HF packet activity without going to an inelegant enhancement (read kuldge) such as mine.

There is no modem supplied on the Ashby board. This can be either an asset or a drawback, depending on personal opinion. I feel that the modem should be external to the TNC, allowing changes in modems and modem technology to not affect the TNC function. Not having the modem on the TNC board allows either more room on the TNC for link support hardware, or allows the TNC board to be smaller in size (as is the case with the Ashby board).

Another minor "nit" about the Ashby board is that rather than supplying room for some kind of connector on the board for interfacing to the outside world, the outside connections are made through a couple ribbon-cables. One of these ribbon-cables is all gray, and provides grounds for all external connections. The other ribbon-cable provides the link and terminal connections, along with a wire for an external reset switch. The power comes in on an additional pair of wires. Having to hard-wire the board into a chassis eliminates the potential of connectors coming loose, but reduces greatly the ease of troubleshooting a system. Some sort of arrangement could be made to provide connectors in-line, but that would still preclude quick-changing boards during a troubleshooting session, since almost never do two hams agree on what type of connector to use, much less how that connector will be wired. The only way we hams seem to standardize is when a manufacturer forces us too, and I've known that to fail also.

Ashby has made available a "power supply" for their board. It consists of a wall transformer which will deliver about 9 volts at enough current to run the board (while staying cool). This is a MAJOR improvement over the Vancouver board, with its plus and minus 12 volts AND plus and minus 5 volts power requirements. The savings on the power supply alone might make up the additional cost of the Ashby board. Incidentally, the Ashby wants +8 to +10 volts, not +12 volts. This input goes directly into a LM-340T type regulator. If +12 volt operation is anticipated (such as from a car battery), either a dropping resistor or a pre-regulator should be used.

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Software Support

Since the Ashby board is basically a Vancouver clone, most code for the Vancouver board will run on the Ashby board unmodified. This includes the AX.25 LIP/TIP and repeater code. For a slight additional charge, Ashby provides the code burned into EPROM with your call installed, making life a little easier. Unfortunately, the code they burned for me would not operate through an AX.25 repeater. Since I had code that did work for the Vancouver board, it was simply a matter of re-burning the EPROMs with my code and the problem was solved. We are shipping Ashby a new set of our code, which should cure that problem.

They did alter the AX.25 version of the TIP/LIP software to change the sign-on message and change the "special character" (I really dislike that name) to the escape character rather than the normal control-P in TIP/LIP.

The commands available to the user are the same as the AX.25 TIP/LIP commands for the Vancouver board and are as follows:

K8MMO 1	[ESC]	C	Attempt to connect to K8MMO 1.
	[ESC]	D	Disconnect from other station.
	[ESC]	E	Enable local echo.
	[ESC]	NE	Disable local echo.
	[ESC]	I	Re-initialize board.
	[ESC]	L	Automatic linefeed after CR.
	[ESC]	NL	Disable automatic linefeed.
	[ESC]	P	Force a frame to be sent.
WB4JFI5	[ESC]	R	Sets repeater address.
	[ESC]	NR	Turns off repeater operation.
	[ESC]	S	Recognize special character.
HH	[ESC]	T	Force the control field to HH.
	[ESC]	NS	Disable special character mode
HH	[ESC]	O	Sets PID to new value HH.
	[ESC]	7	Masks Terminal data to 7 bits.
	[ESC]	8	Masks Terminal data to 8 bits.

In addition to the above "commands", several other characters can cause things to happen. Some of these are:

LF	Place a Linefeed in buffer and send it.
CTL-D	Dump memory (10(CTL-D) dumps 256 bytes starting at 1000 Hex.
CTL-Q	Restart output to terminal after CTL-S
CTL-S	Suspend output to terminal.
CTL-U	Cancel present line from terminal.
Delete	Eliminate last character from buffer.
Backspace	Same as delete (causes BS-Space-BS).

As with the Vancouver board, the special character, the callsign of the station, and the terminal speed and parameters settings are burned into the TIP EPROM at assembly time, so please notify Ashby what configuration you want (normal is 1200 baud, 8 data bits, no parity).

Documentation

Along with my PAC/NET board, I received a schematic diagram, a parts layout of the board, a note on configuration of this board, and an 8 inch single density disk with some documentation files. I told Bill Ashby that I had a standard CP/M system, so an 8 inch CP/M diskette was the easiest method of sending the documentation.

The schematics and board layout diagrams are large and easy to read. No problems here reading small bluprints such as the Vancouver board, or no diagrams at all, like the GLB PK1.

The documentation on the floppy consisted of some text files showing how to hook up the board, a brief description of how to hook to 202 modems, some company history and philosophy, the source code and doc files from AMRAD as modified by Ashby, and the AX.25 protocol specification files. I started to say that the documentation is even skimpier than the Vancouver board documentation (yes, we have also installed the pull-up resistor for the 8085 in the wrong hole), but I quickly remembered this is a fully assembled and tested board, which makes a BIG difference. I am sure Ashby has available documentation on the old style format (paper) if requested.

Pricing and Delivery

The PAC/NET board is available in the following forms:

Board only, assembled but no ICs	$80.00
Package of ICs less EPROMs	$80.00
Power transformer	$10.00
Assembled and tested complete board with code burned into EPROM, including your callsign, etc.	$240.00

They also mention that some programming for certain computers to interface to the PAC/NET board is available, please contact them directly for more information on your system.

Availability at the time I received this PAC/NET board was from stock, check with them on the latest when ordering.

Conclusion

Even though it costs slightly more, I would recommend this board to those interested in the Vancouver series boards. It doesn't have a lot of bells and whistles, but it is an adequete system to get on and enjoy packet radio with.

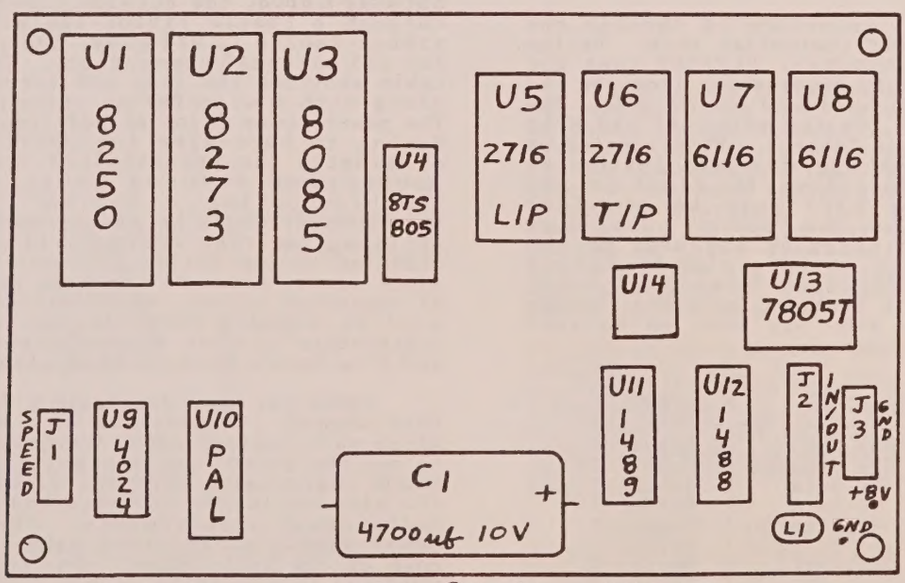

FIGURE 1. ASHBY BOARD LAYOUT

Alterations To AX.25 Level 2 Document By ARRL Digital Comm.

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The following are alterations and corrections to my level 2 paper in the Second ARRL Amateur Radio Computer Networking Conference proceedings. Page numbers here refer to the page numbers of the proceedings. The following corrections are being suggested by the ARRL ad-hoc Digital Committee, meeting on November 13, 1983, in the Washington D.C. area.

The following paragraph should be added to the end of the **AX.25 Layer 2 Protocol Specification** section on page 4.

This protocol does not prohibit self-connections. A Self-connection is considered to be when a device establishes a link using its own address for both the source and destination of the frame.

The PID-Field field description on pages 4 and 5 should be replaced with the following:

PID Field

The Protocol Identifier (PID) field should only appear in Information frames. It identifies what kind, if any, of level 3 protocol is being used. The PID itself is NOT included as part of the octet count of the I-frame. The encoding of the PID is as follows:

M S B	L S B	
xx00xxxx		Reserved at this time.
xx01yyyy		AX.25 layer 3 implemented.
xx10yyyy		AX.25 layer 3 implemented.
11110000		No layer 3 implemented.
11111111		Escape character. Next byte contains more layer 3 protocol information.

Where:

1. An x indicates a "don't care" bit.
2. A y indicates all combinations used.

Note:

All forms of yyllyyyy other than those listed are reserved at this time for future layer 3 protocols. The assignment of these formats is up to amateur agreement. It is recommended that creaters of layer 3 protocols contact the ARRL Digital Committee for suggested encodings.

On page 5, first column, the term "even multiple of octets" should be changed to "integral number of octets". The original document did not mean to imply that there must be an even vs odd number of octets, but rather that there should be full eight bits per character, with no extra bits left over.

On page 5, under Address Field Encoding, an additional sentance should be added as the second sentance in the first paragraph. It should read as follows:

Except for the Secondary Station ID, the address field should be made up of upper case alpha, and numeric ASCII characters only.

The following four paragraphs should be added at the end of the Level 2 Repeater Address-Field Encoding section at the top of page 6:

Multiple Repeater Operation

An addition to the original AX.25 protocol allows operation through more than one repeater, creating a primitive routing mechanism. Up to eight repeaters can be used by extending the repeater address sub-field. When there is more than one repeater address, the repeater address immediately following the source address is the address of the first repeater of the multiple repeater chain. As a frame progresses through a series of repeaters, each successive repeater sets the H-bit in its SSID octet, indicates that the frame has been repeated through it. No other changes to the frame are made (except for the re-calculation of the FCS), specifically, repeater addresses are not deleted as the frame passes through them. Since no addresses are deleted, the destination station can discover what sequence of repeaters was needed for any frame to reach it.

The number of repeater addresses is variable, and is determined by the use of the HDLC extender bit. All but the last repeater address will have its extender bits set to zero, and all but the last octet (SSID octet) will also be set to zero. The extender bit of the last octet of the last repeater address octet will be set to one, indicating the end of the address field.

It should be noted that various timers (including T1) may have to be adjusted since multiple repeater operations may take a frame longer than usual to progress to the destination station and a acknowledgment to return through the same path.

Subject to further discussion is a recommendation that symbolic addresses be allowed to indicate multiple repeater links by a single repeater address sub-field. An example of this might be to use a repeater address of (SFO 1) to indicate a link of repeaters starting at San Francisco and ending in Los Angeles. The first repeater in the chain would recognize the SFO 1, and expand it to the normal repeater addresses required as stated above before sending the frame on. Note that at this point, this is NOT part of the standard, and is subject for further study.

The next change has to do with the encoding of the Secondary Station ID. At the bottom of the second column of page 5, under Figure 3, change note 5 to the following:

5. The SSID portion of the last octet has been intentionally left vague at this point. The only SSID's assigned at this point are as follows:

0000 First personal station SSID
1111 All-call SSID

The 0000 SSID is reserved for the first personal packet atation. This establishes at least one standard SSID for normal packet stations to use.

The 1111 SSID is reserved as an all-call SSID, which is used to attempt to communicate with a station whose callsign is known, but the SSID is not. Any station receiving a frame with its callsign and a SSID of 1111 should respond if it is capable at the time.

The next alterations made concerns the DM frame. On page 7, second column under Disconnected Mode (DM) Response heading, the first paragraph has a change to be made. Change "other than a SABM frame" to "other than a SABM or UI frame".

Next, add the following paragraph after the first existing one:

Anytime a SABM frame is received, and it is determined that a connection is not possible, a DM frame should be sent. This indicates the station cannot accept a connection at this time.

Another subject for further study at this point is the proper operation of the poll/final bit. It appears that this bit is somewhat ambigious, especially since the direction bit in the address field of an X.25 frame is not being employed. Some users of this protocol have not implemented the P/F bit, relying on timers and other methods to recover from link malfunctions. Careful attention must be paid before removing the P/F bit. Just because other methods of link recovery are possible at low speeds does not necessarily mean the same thing will work at high data rates and full duplex links.

PROTOCOL

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Apology

I received an irate letter from Doug Lockhart, which I deserved. I really said some unkind things about his protocol. I was trying to express an opinion, which is; use AX.25 protocol for all packet work, and I offended over 50 active users. I apologize to Doug and any Vancouver protocol users for suggesting their protocol be "trashed". **(See Doug's Letter Next Page)**

AMRAD has always been for experimenters and we encourage doing whatever experiment you want. We also encourage standards, which is why I got carried away in my standards rhetoric. I made an outright error also. The address field of the Vancouver protocol has not been changed. I received some incorrect information (stemming from the Dayton Hamvention I think) that a change had occurred and it has not. I am sorry Doug, I will try to do better. I think the current Vancouver protocol as used by Doug limits the number of users to 253, but I am not sure. Contact Doug Lockhart, 9531 Odlin Road, Richmond, B. C. V6X 1E1 for any and all information on the Vancouver protocol.

Repeater

The 145.01 Mhz simplex AX.25 packet repeater is doing well at the Channel 9 (WDVM) location. It has good coverage and only two faults we can find:

A. Once and a while, the packet board goes to sleep. We have an 18 minute hardware reset on it that clears the problem, but waiting 18 minutes can be a drag.

b. More often, the receiver seems to go deaf for short periods. We figure that another radio service in the vicinity is doing us in, but that should only be during the day but we notice it a lot at night.

High Speed

I called Bill Ashby the other night to ask if he wanted in on our HF experimentation and he declined. It seems the New Jersey gang is experimenting with 9600 baud 220 Mhz direct FSK, like the old Ottawa Digipeater. This sounds like good fun. Bill used the Ashby board (clever choice there) at 9600 baud with no trouble. They demodulate at 10.7 Mhz and are looking forward to going faster. I wish I had time to experiment with everything! He was amused by our 300-1200 baud H.F. work, but wished us luck.

High Frequency (2-30 Mhz)

We of AMRAD were well educated by our leader Paul Rinaldo on the drawbacks of H.F. data transmission. He told us all the bad things (atmospheric noise, man-made noise, multipath propagation causing intersymbol distortion, and fading (usually selective on the mark or space but not both at once). In true AMRAD tradition we have ignored all that and are forging ahead. We want to go 2400 baud on H.F. or at least 1200 baud. So we started to experiment. Our first experiments years ago were on 10 meters at 1200 baud. Ten meter work is easy, plug you packet board into your H.F. rig and fire up on 10 meters at 1200 baud. It works if there is a path between the two packeteers. But as we all know, H.F. is perverse, here this minute-gone the next. The buzz word of the 80's is "adaptive". We figure to adapt our packet setup dynamically to the problem.

If we need a path to Denver and Don Lund for example, then instruct our computer to do it. The computer will try different bands trying to get near the Maximum Usable Frequency (M.U.F.) and run 1200 baud (we are applying for 1200 baud everywhere STA).

Failing that, the computer will arrive at some band where a path to Denver exists and commence requesting a connection. Once the connection is established, we plan to use the Rinaldo Packet Adaptive Modem working in conjunction with the Fox Packet Assembler Disassembler (PAM-PAD) to set up the correct packet speed to communicate well. Then the packet length is adjusted to best choice (good path, long packet and poor path, short packet).

Then the actual file is sent to Don (probably the built up CBBS traffic for Denver). Sounds far fetched huh? All the better for AMRAD dreamers. So,in order to get this off the ground, we have commenced the necessary groundwork (leaving the skywork to AMSAT).

H.F. Experiments

We have commenced H.F. experiments with Washington to Newington, Conn (ARRL headquarters) circuits and local circuits at 300 baud using our standard 202 modems. First we must establish some frequencies to operate on. They cannot be in the RTTY portions of the bands as RTTY cannot compete with packet. RTTY hogs the entire passband of your receiver whereas a CW station and a packet station and a Canadian SSB station can all more or less share a frequency. RTTY has no down time and thus no time division multiplex is possible. Currently only one frequency has been found by AMRAD to be nice on eighty meters (3694.5 KHz). Candidate frequencies have to be checked for days to ensure that no traffic nets meet there regular or other unknown bogosity show up. I think TAPR has the right approach, they are going to 10 Mhz. AMRAD will attempt to find out their packet frequency choice and start operating there soonest. That band seems a natural for this sort of thing, but remember our adaptive concept, we must have at least one or two freqs on each band designated.

Bob Bruninga, WB4APR, has been running this excellent CQ service every 5 seconds on eighty meters for me to experiment with (3694.5 KHz). He sends a time packet every 5 seconds. My packet board gets it (or not) and I print it, 20 to a line. I then count how many I got and how many I missed. From this simple experiment, I am going to write a program that we are still discussing, that does the count and plots good information about the path. Simple results so far:

131525-16024022 JAN 84 -- 2007 sent,1627 received
161315-192400 22 JAN 84 -- 2258 sent,1512 received

This implies what you would expect. In the daytime when the sun is up, a groundwave path exists between us. Bob reads S0 on the meter, but there is no interference and low noise. Most packets, in this case 81%, got through. When the sun went down, the D layer went away and slowly Bob's signal strength rose to S9 and multipath started to do us in. The get result dropped to 67%. The interesting part to me is CW and SSB interference was not a big problem. The offending station had to get on just the right frequency to do us in. I really liked the case where this loud CQ showed up right on top of us (it seemed) and the packets sailed thru. I am almost ready for an AMTOR/PACKET thruput contest right then, but we need a better modem for that. We are awaiting the arrival of our first PAM from Paul to experiment with.

Correspondence From Doug Lockhart

Dear Terry,

I received my copy ot the AMRAD newsletter for August/September 1983 today and was very surprised to read about my activities in the "Protocol" section of the newsletter. My surprise turned to disappointment quickly because the information and advice contained in the item headed 'Another Protocol! - NO!' is inaccurate..

The item says, "Our founding packet father, Doug Lockhart, has redone the Vancouver protocol again, and changed the address field." This is not true, I have not changed the address field nor have I changed any other thing in the protocol. In fact the newest and the oldest Vancouver protocols are compatible with each other. In fact versions of the software done in the summer of 1983 are quite compatible with versions done in 1979. There are over 50 active users in the Toronto area using many versions of software but because we all use the original Vancouver protocol we all are compatible with each other.

I do not know exactly what was said in the conversation that Dave Borden had with Don Lund but if I was told that a TAPR board was not communicating with a Vancouver board I would not know at once what was wrong when I heard that the Vancouver board was using the Vancouver protocol.

Later in the item Dave says, "All old Vancouver software and new Vancouver should be trashed." Although it can be construed as a matter of opinion, I take great exception to this advice. Many active packeteers in a number of locations have developed and are developing very useful software based on the Vancouver protocol. The largest active packet group that I know of (Toronto area) is exclusively using this protocol, a large group in Sydney (about 20) is using it and the repeater program developed in Toronto this year is one of the best around. I am not aware of any auperior program for AX-25 running on the Vancouver board. There is a plentiful supply of programs for the Vancouver board using the Vancouver protocol but a scarcity of similar programs for AX-25. To suggest trashing programs that have been developed in the last few months seems to me to be a drastic action. There are a large number of application programs developed for the protocol, most of which are superior to anything running AX-25 on the Vancouver board.

Dave says in the article. "All protocol wars are over and our mission now is to continue onto Level 3 protocol definition." I also thought this was true, and was surprised by the advice which proceeded it. Personally, I think that everyone has the right to decide which protocol they would like to use in their area. I have never recommended to anyone that they trash AX-25 software either old or new. My advice to others has always been to use the protocol that others are using in their area whatever it may be.

The fact is, both AX-25 and the Vancouver protocol are only link level protocols (Level 2) and bothe are working satisfactorily at that level. Both have their advantages and disadvantages and both will be replaced by a new protocol which will work up to the network level (Level 3) and perhaps beyond. Both are very transitory in nature so there is no need for standardisation except in a local area. When networking comes in, new software will have to be provided for all boards and some standardisation between different areas will need to be done then.

Members of the VADCG and others in Toronto and elsewhere, including myself are always ready to help new users, such as Don Lund get on packet radio. I am sure members of AMRAD are willing to do the same. I was trying to assist Don by sending him copies of software for the Vancouver board. By telling him to trash all the software I have sent him does not make my help to him appear very valuable. It is doubly distressing when I see this advice published in a newsletter receiving wide distribution. I hope you will also publish my reply to the article.

Yours Truly,
Douglas Lockhart, VE7APU

EDITORS NOTE:

The confusion about a "new" Vancouver protocol lies partly with me. While at the last Dayton Hamvention, Doug informed me that some of the Vancouver protocol users were starting to notice the cramped address field, and that he and others were either working on, or had implemented a modified Vancouver protocol based on a two byte address field (it was vague as to whether this was actually running or in the planning stages). I had mentioned this conversation to Dave, and as a result, Dave assumed the "new" Vancouver code must have been sent to Don. I guess this "new" Vancouver addressing scheme has not been implemented (may not be?), but I cannot say for sure until Doug gives us more information on it.

Terry

AMRAD Amateur Radio Research and Development Corporation

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The Amateur Radio Research and Development Corporation (AMRAD) is a worldwide club of over 500 amateur radio and computer experimenters. It is incorporated in Virginia and is recognized by the U.S. Internal Revenue Service as a tax-exempt scientific and educational organization.

The purposes of AMRAD are to: develop skills and knowledge in radio and electronic technology; advocate design of experimental equipment and techniques; promote basic and applied research; organize technical forums and symposiums; collect and disseminate technical information; and, provide experimental repeaters.

Meetings are on the 1st Monday of each month at 7:30 P.M. at the Patrick Henry Branch Library, 101 Maple Ave E, Vienna, VA. If the first month is a holiday, an alternate date will be announced in the newsletter. Except for the annual meeting in December, meetings are normally reserved for technical talks - not business.

WD4IWG/R is an open repeater for fm voice and digital communications, especially for experimental modes. It is located at Tyson's Corner, McLean, VA. It features semi-private autopatch available to licensed members. Frequencies are: 147.81 MHz in, 147.21 MHz out. The repeater director is Jeff Brennan, WB4WLW.

WB4JFI5/R is a 1200-baud half-duplex packet repeater located on the south leg at the 200 ft. level of the WDVM/WJLA TV tower. The tower is located at Wisconsin Ave. and River Rd. in northwest Washington DC, and the repeater runs the AX.25 level 2 protocol. The frequency for the WB4JFI5 packet repeater is 145.01 MHz simplex.

The AMRAD CBBS, 703-734-1387, is operated by Terry Fox, WB4JFI. The system accepts 110, 300, 450 and 600-baud ASCII, Bell 103.

Handicapped Education Exchange, 301-593-7033, is operated by Dick Barth, W3HWN. HEX accepts 110/300-baud ASCII and Baudot deaf TTY/TDD calls.

AMRAD is affiliated with the American Radio Relay League (ARRL), Foundation for Amateur Radio (FAR), Northern Virginia Radio Council (NOVARC) and the Mid Atlantic Repeater Council (T-MARC).

The AMRAD Newsletter is mailed monthly to members and other clubs on an exchange basis. Technical articles, product announcements, news items, and other copy relating to amateur radio and computing are welcome. Honorariums at a rate of $0.10 per 50-character printed line ($20 maximum per author per issue) are paid for original material accepted. Classified ads are free to members. Commercial ad inquiries are invited. The editor reserves the right to reject or edit any portions of the copy. Items should be mailed by the 8th of the preceeding month to Editor, AMRAD Newsletter, P.O. Drawer 6148, McLean, VA 22106. Full permission for reprinting or quoting items is granted provided that credit is given to both the author and the newsletter. Mailing to U.S. and possessions is by 3rd Class bulk mail. Canadian and Mexican addresses add US$2 for postage. Overseas readers add US$8 for air mail or US$2.30 for surface.

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